Information, know-how and knowledge management : a strategic factor for logistics suppliers facing the temptation for shippers to reintegrate logistics operations

Nathalie Fabbe-Costes

Här hålls sessionen

SESSION 1
Operan

SESSION 2
Katedralskolans aula

SESSION 3
Studion
13.30 - 15.30

SESSION 4
Sonaten
13.30 - 15.30

SESSION 5
Sonaten
16.00 - 18.00

SESSION 6
Wallenbergssalen

SESSION 7
Operetten

SESSION 8
Verdefoajén

SESSION 9
Spegelfoajén

SESSION 10
Solot

SESSION 11
Keramiksalen

SESSION 12
Konsertsalen

SESSION 13
Duetten
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SESSION 14
Duetten
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SESSION 15
Teaterverkstaden

SESSION 16
Dansstudion

SESSION 17
Musikalen

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Spegelfoajén

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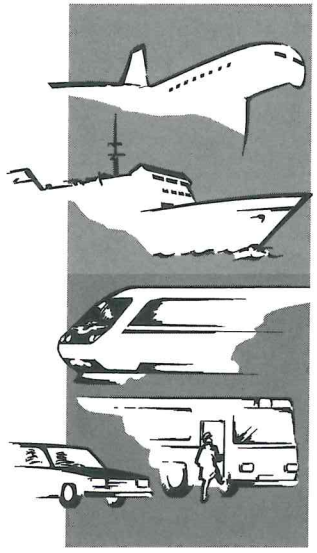
SESSION 37
Solot

VTIs och KFBs
FORSKAR-DAGAR

10 – 11 januari 1996



TRANSPORT Forum LINKÖPING

PROGRAM ONSDAGEN DEN 10 JANUARI 1996

SESSION 7

13.30

SJÖFARTSFRÅGOR
Inledningsord av Olle Rutgersson

Fartyget i transportkedjan
Ordförande: Hans Broberg, SSPA

Ett skepp kommer lastat - presentation av Sjöfartspolitiska utredningens betänkande
GD Gunnel Färm, ordförande i utredningen

Sjöfartsforskning i Europa - En överblick
Per Jessing, Sveriges Redareförening

Aspekter på svensk sjöfarts konkurrenskraft i framtiden
Kaj Rehnström, Sjöfartens analysinstitut

HSS ????
Stig Bystedt, Stena AB

15.30 - 16.00 KAFFE

Nya koncept för Europasjöfart
Klaes Lundberg, Tor Line AB

Framtida fartygstransporter på ostkusten
Anders Sjöbris, Mariterm AB

Projekteringsmetoder för snabba godsfartyg
Johan Näreskog, Skeppsteknik, KTH

Management av containertransportsystem
Lars Hultén, Transportteknik, CTH

18.00 AVSLUTNING

SESSION 8

13.30

VINTERVÄGHÅLLNING OCH DÄCKANVÄNDNING. SENASTE NYTT I NORDEN
Ordförande: Gudrun Öberg, VTI

Väggreppsprojektet
Jon Krokeborg, Vegdirektoratet, Norge

Finska vinterprojektet
Anne Leppänen och Video, Vägverket, Finland

Förarbeteende på intervägar
Carl-Gustaf Wallman, VTI

The effects of reduced salting of Rural Main Roads in the province of Kuopio
Leif Beilingson, VTT, Finland

Salting og trafikksikkerhet i Norge
Ole Peter Resen-Fellie, Vegdirektoratet, Norge

Olycksrisk för fotgängare och cyklister
Hans Velin, VTI

15.30 - 16.00 KAFFE

Varifrån kommer saltet i brunnen
Karin Jansson, VV, Lars Bäckman, VTI

Saltets påvirkning på jord og vegetasjon
Per Anker Pedersen, NLH, Norge

Minskad saltförbrukning
Örjan Falegård, VV

Vinterindeks
Freddy Knudsen, Vejdirektoratet, Danmark

Jämförelse mellan äldre och yngre väglagsfördelningar
Staffan Möller, VTI

18.00 AVSLUTNING

PROGRAM ONSDAGEN DEN 10 JANUARI 1996

SESSION 9

13.30

GODSTRANSPORTER OCH MILJÖN
Ordförande: John Landborn. TFK

Nätverket för godstransporter och miljön (ngm)
John Landborn, TFK

Ett miljöanpassat vägtransportsystem
Rickard Sandberg, Vägverket Region Sydöst

Miljöfrågor inom luftfarten
Lars-Gunnar Larson, Flygtekniska försöksanstalten FFA

Miljöindex för transportkedjor
Bengt Sävbark, Ecotraffic

Vad gör företagen?
Alf Olofsson, Göteborgs Hamn
Eddie Hansson, Södra Transport

15.30 - 16.00 KAFFE

Paneldebatt:

Godstransporter och miljön - hur skapa ett långsiktigt hållbart transportsystem
Debattledare:
Åsa Lindell Byström, Bilspedition

Eddie Hansson, Södra Transport
Per Jessing, Sveriges Redareförening
Lars-Gunnar Larson, FFA
Alf Olofsson, Göteborgs Hamn
Rickard Sandberg, Vägverket
Bengt Sävbark, Ecotraffic
Johan Trouvé, SJ

18.00 AVSLUTNING

SESSION 10

13.30

INTERNATIONAL WORKSHOP

Measuring and improving efficiencies to enhance profitability in road distribution
Chairman: Professor Bernhard Tilanus, Eindhoven University of Technology, The Netherlands
Erik Malmasten, Professor at Handelshögskolan of Göteborgs Universitet

Gaining competitive advantage from information systems in intermodal transports
James Cooper, Professor at Cranfield School of Management, Cranfield, UK

Smart card applications in the harbour of Rotterdam
Cees Ruijgrok, Professor at Catholic University Brabant, Tilbury, Netherlands, and director of INRO - TNO Institute of spatial planning - Applied physical research) Delft, The Netherlands

Strategy developed by logistics suppliers facing temptation for shippers to reintegrate logistics operations
Nathalie Fabbe-Costes, professor at CRETLOG, University of Aix-en-Provence, Marseille III, France

15.30 - 16.00 COFFEA

Creating added value in transport operation by tracking and sequencing individual transport unit´s
Professor Lars Sjöstedt, Chalmers Universitet

On models to consider the impact of information and communication on transportation and distribution systems
Professor Birger Rapp, Linköpings Universitet

Panel discussion
Moderator: Professor Bernhard Tilanus

High quality information systems: opportunities or threats to the logistics service industries?

18.00 CLOSING REMARKS AND COFFEA

Annual Meeting of Transport Research
organized by the Swedish Road and Transport Research Institute
Linköping, Sweden, 10-11 January 1996

INFORMATION, KNOW-HOW AND KNOWLEDGE MANAGEMENT : A STRATEGIC FACTOR FOR LOGISTICS SUPPLIERS FACING THE TEMPTATION FOR SHIPPERS TO REINTEGRATE LOGISTICS OPERATIONS

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INTRODUCTION

Nobody would contest that since the beginning of the 80's, logistics has become a real industry and that logistics suppliers have been playing an ever increasing role within logistics chains. This evolution had lead to the development of alliances between shippers and logistics suppliers but also alliances among logistics suppliers. Most authors working on this topic are convinced that the general trend of subcontracting logistics activities will continue and base their research on this hypothesis.

In our research center the CRET-LOG[1] , we have been taking interest in the logistics outsourcing phenomena since the beginning of the 80's, and we have been looking closely at the built alliances. In particular, we took part in a European research undertaken in liaison with the CELO[2] and the McKinsey corporation[3] . During the interviews realized for this research, some logistics managers of major European or multinational companies told us that they would probably reintegrate some important subcontracted logistics activities. They also gave us some arguments justifying such a decision.

For Jacques COLIN and me, this information has been the starting point of a research reflection that we enriched with new interviews with logistics managers. The formulation of the topic was roughly : why should shippers be tempted to reintegrated certain logistics activities? What kinds of activities are concerned? On the hypothesis of reintegration, what kind of preventive strategy action should logistics suppliers develop?

We have presented the first results of this research in a paper at the 7th World Conference on Transport Research[4] . Concerning preventive strategy for logistics suppliers, the 3 main results of our research were : first that logistics suppliers should build a coherent and homogeneous "portfolio of strategical logistics activities", second that they should improve the management of what we called the "three inter-related spaces of competence" (action, know-how and knowledge), third that among the many strategical options available "alliance" appears very interesting but under certain conditions.

In line with this first paper, we would now like to deepen the role of information, know-how and knowledge management for logistics suppliers facing the temptation for shipper to reintegrate logistics operations.

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[1] Centre de REcherche sur le Transport et la LOGistique

[2] CELO (Centre of European LOgistics) is an association of European research centres specialised in logistics and of which CRET-LOG is a member.

[3] The main results of the research have been published by VAN LAARHOVEN P., SHARMAN G. (1994), Logistics alliances: The European experience, The McKinsey Quarterly, 1994 Number 1.

[4] Strategies developed by logistics suppliers facing the temptation for shippers to reintegrate logistics operations, N. FABBE-COSTES, J. COLIN, communication for the 7th World Conference on Transport Research, organised by the IPACE, The University of New South Wales, 16-21 July 1995, Sydney, Australia (available in french and in english).

We will begin with the main characteristics of the logistics supply industry (chapter 1) and the reasons why shippers are tempted to take back in house some logistics operations (chapter 2). Then we will focus on the strategical importance for logistics suppliers to manage what we have called the "three inter-related spaces of competence" and develop the role of information, know-how and knowledge management (chapter 3)[5] .

1. CHARACTERISTICS OF THE LOGISTICS SUPPLY INDUSTRY

1.1 Logistics activities have always been disputed

During its evolution since the end of the 60s, the logistics activity market has proved to be a highly disputed one. The different logistics activities form an "industry" in which the logistics organizations set up by manufacturers, retailers and logistics suppliers - often "originating" from the transport sector - are either in competition or are complementary.
Each of these three protagonists may expect to extend his activity by controlling logistics operations, using as a basis his core business that can be compared to an unassailable "stronghold".

- Manufacturers centered on their plants often tend to control their inbound logistics (supplies to the manufacturing facility) and their outbound logistics (supplies to customers or retail networks). At a time when stocks are being reduced, service levels improved and "just-in-time" methods becoming more prevalent, manufacturers see powerful and structured logistics as a way to guarantee their efficiency, reliability and durability.
- Retailers who direct their attention to managing their sales outlets may also be tempted to take control of supplies to their sales areas. This therefore enables them to regulate deliveries, reduce the level of shelf stock and dispense with stocks. The ever increasing size and number of their retail outlets[6] and purchasing power allow them to take full advantage of the economies of scale as seen in the merging of flows (transport, storage). By integrating logistics activities, retailers may thus take advantage of the gains in productivity they have achieved and increase the reliability of their organization.
- Logistics suppliers, acting as an interface between the logistics systems of both manufacturers and retailers, tend to exploit this potentially favorable situation by building up a "neutral" multi-manufacturing and/or multi-retailer logistics, able to operate shared distribution operations. It is thus obvious that, in theory, the logistics supplier is then in an optimal position regarding the merging of flows.

[5] Chapter 1, 2 and section 3-2 are mainly composed with selected extracts of [FABBE-COSTES, COLIN 1995], but I have add some information and rewrite many passages. I thank Jacques COLIN for having given me the authorization for this use of our collective work.

[6] Between 1978 and 1992, the average size of French hypermarkets increased from 3,713 m2 to 5,567m2, i.e., a 50% increase. At the same time, the market share for super and hypermarkets rose from 30 to 62% of the French food market.

In fact, the same logistics activity can be performed by one or other of the three partners of the logistics chain, depending on how far they chose to extend their original activity. It is not possible to allocate this activity, in advance, to one or the other.
Nevertheless, the logistics suppliers participation in logistics chains has been developing and the logistics supply industry became a fully fledged sector of activity with its own professionals.

1-2 Evolution and characteristics of logistics supply industry

In Europe, notably in France, the logistics supply industry has developed through four main stages.
The 70s saw the arrival of the first generation of logistics suppliers resulting of a direct hiving-off of the actual distribution sector of a number of large manufacturers. These companies undoubtedly pioneered the development of logistics skills, even if the major part of their activity concerned warehousing and forwarding. From this time onwards, transport was subcontracted to very small transport operators.
This logistics know-how gradually spread to road transport companies that were often regional. They took advantage of this to diversify, by supplementing their original transport services with other services. National networks began to appear and consolidated the services of several regional companies. These operators, logistics suppliers to several large manufacturers, combined their respective flows to provide consignee groupages, mainly for supermarkets. This period also saw the development of logistics suppliers resulting from the "quasi hiving-off" or hiving-off of a number of retailers who, by controlling the wholesale business, were able to supply their affiliated companies.

The end of the 80s corresponded to a "boom" in the logistics profession. It produced specialized logistics suppliers who developed state-of-the-art expertise :

- some chose to become logistics suppliers to the large-scale retail companies for which they set up customized solutions;
- others, taking advantage of the know-how they had acquired downstream of these chains, concentrated on supplying industrial plants using the just-in-time system to varying degrees. They could even pre-assemble components to deliver a complete module: e.g. a front shield fitted with electrical and optical beams to a car assembly unit;
- conversely, some logistics suppliers concentrated on the far downstream of logistics chains and devoted themselves to spare part logistics;
- finally, some wholesalers completed their wholesale business activities by providing purely logistic services (e.g. pharmaceutical products wholesalers), and a number of them even found themselves devoting equal time to logistics supplies and their wholesale activities.

The final phase of this progression towards a flourishing segmentation of the logistics supply industry corresponds to the conquest of a new market : the collection and recycling or destruction of a highly specific flow : waste (salvageable packing and packaging, equipment at the end of its useful life, e.g., computers, household rubbish, industrial waste, etc.). Specialized operators from varying backgrounds (transport, salvage, urban services, etc.) are now appearing in this new market segment, the reverse logistics.

Towards the end of this thirty year evolution, the logistics supply industry would appear to be particularly complex and segmented into several distinct professions[7]. This complexity is accentuated by the extremely large range of logistics suppliers, due essentially to their different origins and the time they have served in this industry. The result is a wide range of experience, culture, knowledge and know-how for companies operating in the same sector of activity.

Today, the logistics service industry would appear to be a maturing, relatively segmented/ scattered[8] industry with the following main characteristics.

- Extreme competition within the industry (logistics suppliers that at the outset operated on relatively unconnected "markets" are now to a certain extent in competition) and a hierarchism within the industry (the "leading" logistics suppliers organize the sections of the chain under their control and subcontract the activities they consider less advantageous to less significant operators that have little room for manoeuvre).
- Market niches appear to be usually risky and/or temporary.
- There are few barriers to entry (notwithstanding financial or cultural conditions for the transport itself, with the exception of road transport). However these barriers tend to be intensified when the service becomes more complex, when innovations are developed faster and the market is extended world-wide.
- There is little protection against being excluded from the market : services may often be substituable one to another (e.g., among modes of transport), as are the logistics suppliers (competition is fierce and the substitution costs for shippers still low). As the slightest failure may rapidly prove disastrous, the position of the logistics supplier is always precarious.
- Shippers benefit from considerable negotiating power, and their management expertise is often greater than that of the logistics suppliers on whom they impose their logistics solutions. They are also loath to bind themselves over long periods and prefer short term contracts (in particular in France). Their experience of controlling logistics activities encourages them to reevaluate constantly the advantages to be gained by subcontracting or performing the work themselves.

[7] Transport of full loads, transport of technical batches, just-in-time supply to factories, physical distribution, express deliveries, specialized high risk transport...

[8] As opposed to concentrated.

This industry, which was able to find a certain equilibrium at the end of the 80s, is again re-structuring. Some factors threatening to upset the existing balance are inherent in the logistics supply industry in particular the increased competition and the hierarchical organization within the industry. Other more significant factors are linked to the development of shipper strategy, in particular the threat that shippers may reintegrate logistics activities. This threat, which has remained constant, has been particularly acute in Europe over the past two years even though it is still yet only psychological.

2. THE THREAT THAT SHIPPERS MAY REINTEGRATE[9] LOGISTICS OPERATIONS

2.1 The strategic nature of logistics operations for shippers

According to a study carried out by BIPE[10] in 1993 "a product spends 15% of its time being manufactured and the remaining 85% in flow operations (storage, transfer, transport...) [....] and the cost of logistics can be estimated at approximately 12% of turnover".
Controlling these logistics times and costs is a strategic challenge for shippers. It influences their manufacturing and commercial reaction capacity. In many cases, it also enables them to take on the potential productivity that is still not exploited to the full.
Furthermore, the impact logistics has on a company is measured not only in cost but to an ever-increasing extent by the quality of the logistics service. The "logistics service" is now becoming an integral part of the offer provided by a large number of companies, and is a decisive competitiveness factor for them. Two surveys carried out by the American consultant AT KEARNEY show the improvement in quality of logistic services in large European companies : an average reduction of 31% of service failures[11] between 1987 and 1992 and an expected reduction of 60% between 1992 and 1997.
Another important factor is that, when generating the added value, both manufacturers and retailers include an increasing fraction of "logistics costs".
However, according again to the study carried out by BIPE, 85% of manufacturing companies use logistics subcontractors, the cost of subcontracting representing 55% of logistics costs as a whole.

This raises a difficult question. Should companies continue to subcontract to take advantage of the skills of a service industry that is becoming increasingly professional or should they reintegrate (or develop) at least partly an activity that has such an important influence on company performance?

[9] When we say that shippers reintegrate logistics operations we enclose both the fact they take back in house some logistics operations and the fact they reengineer the logistics function.

[10] La Logistique dans l'industrie et la grande distribution en France (Logistics in industry and supermarkets in France), BIPE Conseil, February 1993.

[11] The service failures are calculated using the following criteria: compliance with delivery deadlines, full deliveries, damage-free deliveries, correct billing (quantities ordered = quantities delivered).

A good example of this is PHILIPS-ECLAIRAGE that decided to make a substantial capital investment (several hundred million Francs) in a highly automated warehouse. It provides customers (70% wholesalers, 15% supermarkets, 15% fitters) located in France and in certain areas of bordering countries with central supply facilities. PHILIPS-ECLAIRAGE has thus enhanced its reaction capacity and reduced delivery time (maximum 48 to 72 hours). This manufacturing company is therefore performing a typical logistics activity; only transport for final deliveries is subcontracted.

2.2 Shippers' motivations to reintegrate certain logistics operations

Considering the importance of the logistics service, it seems therefore logical that shippers should question themselves as to the advantage of maintaining their subcontractors or reintegrating all or part of the subcontracted operations. Let us consider the motives for reintegration in greater detail.

The temptation for shippers to reintegrate logistics operations is often justified by a need to control the cost and quality of these activities. When activities are subcontracted, this control is linked directly to knowing how to get things done. In view of the rapid developments made in the logistics profession, a number of shippers, that have not performed logistics operations for some time, are unsure of their ability to continue to control these activities and wonder if they are still gaining advantage by subcontracting. They are tempted to reintegrate, at least in part, some logistics activities if only to reacquaint themselves and update their basis for logistics performance evaluation. They are even prepared to re-subcontract this work later, applying new criteria.
An example of this is SAINSBURY that subcontracts only 20 of their 24 distribution centers (warehouses). As stated by David QUARMBY, Managing Director of this British company, "there are two reasons for continuing to own these 4 centers. Firstly we can continue to obtain detailed knowledge of this profession and experience in managing operational tasks. Secondly, it provides us with an opportunity to try out new techniques and new methods without having to persuade a subcontractor to perform what could for him prove a risky investment"[12].

The temptation to reintegrate logistics operations is also justified by the strategic risk taken by shippers when they entrust to logistics suppliers activities that represent a significant competitive advantage to themselves. The level of risk is determined by the operating reliability of the logistics supplier[13] that concretizes and ensures this competitive advantage, and influences the loyalty of the shipper's customers. The level of risk is also determined by the strategic "discretion" (ability to withhold from competitors the same services and/or not disclose the relevant know-how) that influences the ability of competitors to compete

[12] Source: LSA, n°1323 dated 22.10.92.

[13] Its ability to provide actually the service required by the shipper.

with him. The logistics supplier's reliability and discretion are key factors for the sustainability of the shipper's competitive advantage.

Another important factor when choosing between subcontracting / [re]integration, is the level of investment required to perform logistics activities, and the capacity of companies to make these investments quickly profitable before having to face further developments in the logistics environment. For quite some time, this factor provided for manufacturers and retailers a good reason to withdraw progressively, or at least reduce their logistics facilities, particularly for transport. At a time when manufacturers are restructuring on a European scale some of them, when they reach economies of scale they hope to achieve by consolidating their various European activities, may be tempted, like PHILIPS-ECLAIRAGE, by highly automated European warehouses. Able to show a return on these large-scale investments and confident they will have the "support" of financial backers because of their "name", they can obtain somewhat lower rates than those obtained by logistics suppliers. They are now faced with the question of actually undertaking these investments.

The final factor influencing the decision to reintegrate logistics activities is that of personnel. Since the 80s, the increasing complexity of logistics facilities has been combined with rapid developments in Logistics Information and Communication Systems (LICS). At the same time, qualifications for logistics staff have risen, particularly for warehousing, which has also benefited from developments in handling and storage technologies (mechanization, automation). The social differences between manufacturing, retailing and logistics activities are lessening, which makes manufacturing and retailing companies less reticent to reintegrate these operations. The management of logistics personnel is no longer a hindrance to the reintegration of these activities. Warehouse automation is now an alternative to logistics centers that employ large numbers of poorly qualified workers and have a substantial turnover of staff. However, this is only feasible for companies working with sufficient volumes to justify such an investment, and for companies with financial clout, which is rarely the case for logistics suppliers....

2.3 The logistics operations concerned by this eventuality

Discussions with European shippers have revealed that logistics operations are not all concerned in the same way by reintegration. The following examples were given. They are not exclusive one from another and are not presented in order of importance. Shippers only envisage reintegration for :

- operations that directly concern customer services. The more an operation affects the shipper's customer (effects on actual and/or perceived performance, reputation...), the more it is seen to be sensitive. This indicates that logistics have really become a strategic

marketing element for manufacturing and retailing companies;

- operations that require the handling of information thought to be "strategic" (usually pertaining to customers and/or cost structure);
- operations considered to be "critical" in the shipper's logistics process (level of impact on service and/or logistics costs), or more precisely, operations where safety is more important than flexibility;
- operations that do not require too great an investment (particularly those for which physical or informational infrastructures have already been set up within the company);
- operations that make logistics investment quickly profitable;
- operations that require highly specific investment and which logistics suppliers, devoted to shared networking, may find difficult to make profitable;
- operations that do not require staff with a different culture than that already prevalent in the company;
- operations that require highly specific skills, not available from a logistics supplier.

When referring to the two-sided argument of dedicated investments and dedicated skills this factor may work both ways. It is put forward both to justify possible reintegration, in which case dedication usually means a need for "innovation" or inversely, to justify subcontracting, when the resources are already available on the market and "all that then remains to be done" is to make use of them.

Decision to go on subcontracting or, on the contrary, reintegrate logistics activities is in any event contingent. First it depends on the situation of the logistics supply industry at the time "t" when the question is raised (whether it is able or not to perform the logistics service required by the shipper). It also depends on the shipper's perception of the risk/benefit he expects to obtain by continuing to subcontract or by reintegrating these activities. Moreover, this dilemma usually arises when a shipper redirects or reengineers his logistics services. This possible changeover represents a timely break during which to reconsider the options that have been taken, without necessarily resulting in a change in position[14] .

The question of reintegrating activities is not without risk for logistics suppliers. The threat is all the more important that it is the larger companies that are today thinking about reintegration. And they often have proved that where logistics are concerned, no decision is ever permanent. The fact that shippers do not have an actual logistics infrastructure cannot be seriously accepted as a guarantee of the role of logistics suppliers, and protect them in the face of a threat of reintegration. Shippers, in particular manufacturing companies, do

[14] In The new logistics challenge : battle for value-added, communication presented in the "Premières Rencontres Internationales de la Recherche en Logistique, Marseille, France 25-26 janvier 1995, P. van LAARHOVEN indicates that among studied 50 European logistics alliances (shipper subcontracting to logistics suppliers), 43% have been renegociated in 1994. The result of the renegotiation was : 82% have renewed with the exiting partner, 9% have change the provider, and 9% have take in-house.

indeed have the financial resources required to undertake these investments and the personnel to perform the relevant operations.
In fact, the situation shows that reintegration is a threat to be reckoned with, but that subcontracting is not basically brought into question, in particular for transport operations. Nevertheless, the uncertainty of shippers when faced with which attitude to adopt about this question is in itself a sign of the changes that logistics suppliers must anticipate if they want to maintain their position in the European logistics chains.

The "chances" that the move towards reintegration will in fact happen are, in our opinion, directly linked to the attitudes that logistics suppliers will adopt, particularly before shippers make irreversible decisions. Logistics suppliers will therefore benefit from considering preventive strategic action. Our purpose now is not to formulate strategies for logistics suppliers, but to focus on a key factor for their strategic action : the management of information, know-how and knowledge.

3. INFORMATION, KNOW-HOW AND KNOWLEDGE MANAGEMENT : A STRATEGIC FACTOR FOR LOGISTICS SUPPLIERS

3.1 Why should logistics suppliers focus on information and skills management ?

Considering what have been previously said, let us point out the main reasons that justify logistics suppliers to focus on information and skills management.
The extreme competition within the logistics supply industry allows shippers that see logistics as a way to guarantee their efficiency, reliability and durability, to have high standards when they subcontract activities. Those standards concern physical operations of course, but also informational services because shippers want to control precisely the quality / reliability of the logistics operations they pay for. Shippers also want detailed operational information to acquaint themselves with physical operations and maintain their knowing how to get things done. They are also interested in the safety of logistics suppliers' information system, because they don't want anyone to have access to information they consider "strategic". There is another stake in information management for logistics suppliers : it is a master piece in building an efficient and reliable organization. Today, logistic organizations are working with less security margin and any hazard occurring in a chain has a good chance to propagate up to the end-customer, all the more so rapidly that speed of circulation is higher. Logistics suppliers need an information and communication system directly connected with physical circulation to forecast, plan, organize and follow the operational process and react against any disruption.
Information management consequently makes part of the core business and the basic offer of logistics suppliers.

Logistics suppliers must also take in account two factors concerning competition with other suppliers and regarding the threat of reintegration by shippers.

- The fiercer the competition, the greater the risk of substitution by other logistics suppliers, but the lesser the risk that shippers will reintegrate these activities.
- The greater the intelligence requirements, the greater the risk involved in offering the service but the greater the likelihood of there being fewer competitors (complexity of the service tends to intensify barriers to entry).

These factors point out the importance of skills management for logistics suppliers either to differentiate on relatively ordinary services and/or to develop complex logistics services. To provide shippers with specialized or innovative services, logistics suppliers must be able to develop state-of-the-art expertise and to convince shippers of their ability to withhold from competitors the same services and/or not disclose the relevant know-how. Evolution of skills is another key factor to consider. Specialized niches are risky and/or temporary, then logistics suppliers must be able to adapt, even to develop, quickly their expertise. This ability is also necessary to expand on new activities and/or markets.

With the development of technologies[15], logistics operations need higher skills than a few years ago. The problem of skills management is thus crucial for logistics suppliers who used to employ poorly qualified workers and have a substantial turnover of staff. They absolutely need to enhance skills and learn how to consolidate experience if they want to perform qualified logistics operations (remember that shippers have the personnel to perform themselves such operations).

There is another stake in skills management for logistics suppliers : it is the basis of logistics consultancy and engineering services that logistics suppliers can provide and must perform if they want to fit into highly qualified logistic chains.

3.2 Skills management : a three inter-related "spaces" model

Most research work regarding logistics suppliers deals more generally with what they actually do from the operational physical and informational point of view, than with their competence as a whole. Logistics suppliers themselves tend to restrict their thinking to this one aspect. It is true that logistics suppliers are first seen through the logistics operations they perform for their contractors. The first strategic action level is of course to guarantee an appropriate level of quality and cost for these activities.

Like any organization, however, logistics suppliers' running call upon three inter-related spaces[16] of competence : action, know-how and knowledge. The three spaces provide logistics suppliers with a multitude of ways in which to differentiate themselves from other competitors and find a strategic position vis-à-vis shippers.

[15] Logistics is highly concerned by "new" technologies : either information and communication technologies and handling and storage technologies.

[16] By using the word "space" we refer to its mathematical aspect, which enables us to consider several dimensions for each space.

Action is the space where logistics services are actually performed. It is crossed by logistics flows (physical and informational). External demands penetrate through this space: requests for new services, level of quality... It is this space where responses to these demands are expressed.
The actual positioning vis-à-vis the shippers and the competitors is achieved in the action space, which is consequently the "entry barrier" to any logistics chain and a priority for logistics suppliers to maintain or develop their position.

The Know-how space refers to all the resources directly emerging and/or solicited when performing the Action, together with those required for Action's development and/or change. This space includes methods, procedures, technologies and engineering (at the application level) in direct relation with Action.
Know-how is a guarantee of Action's quality, durability and reliability. Logistics suppliers must therefore invest to secure this advantage (drawing up management charts, formalizing procedures...).

The Knowledge space represents the highest level of abstraction of organizational operations. It refers to all the knowledge and intelligence[17] directly emerging and/or solicited within the Know-how space and that is required for it to develop and/or change. It is this level that is solicited by and for strategic design and engineering (at the design level). It is within this space that the teleological aptitudes of a company are found.
The guarantee of company durability is its ability to evolve, adapt and "transform". This can only be achieved by mobilizing knowledge. Logistics suppliers should therefore invest in "grey matter" (evolutive knowledge capital) and in R&D notably to convert into knowledge everything that is experienced and perceived[18].

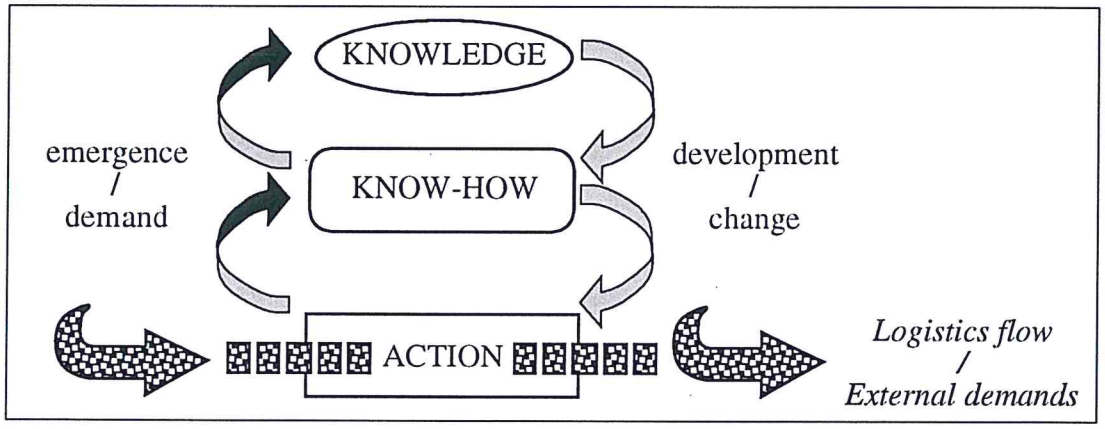

Figure 1 : Three inter-related spaces of competence [FABBE-COSTES, COLIN 1995]

[17] This word is used to express the ability to understand, conceive and decide (J.L.LE MOIGNE 1990).

[18] In this respect we advocate the learning approach that, in our opinion, is vital in the field of logistics (see N. FABBE-COSTES 1993 and 1994), and which solicits the three spaces referred to in this paper.

Figure 1 shows that an ascending connection between one space and another expresses either a demand from the "lower" space (expression of what is needed to "operate"), or an emergence (operating at a level produces factors for the "upper" level). Inversely, a descending connection expresses the role of the "upper" space in the development and/or change in the lower space.

It is only by working on the two upper levels that complex offers of service can be imagined and built up (trends in outsourcing logistics activities show that complexity is no longer an obstacle to their being subcontracted). According to us, this aspect should be emphasized, as logistics suppliers neglected these two levels over a considerable time. Proof of this can be seen in the recruiting policies of logistics suppliers and organizational re-structuring at the end of the 80s (management staffs were most affected by redundancy, particularly staff working in the organization and method departments).

This reflection about action, know-how and knowledge management leads directly to information management. Action produces and uses a lot of information of many kinds. To a certain extent know-how and knowledge are information. The three spaces need information and communication systems to operate and develop. Information management is thus becoming a strategic factor for logistics suppliers in particular if they want to go on performing value added logistics operations.

3.3 Scope in information management

Before looking at information management in detail, let us examine the informational requirements or favorable factors to maintain close alliance with shippers on "sensitive" logistics operations (those concerned by the threat of reintegration).

- The tendency for shippers to reduce the number of logistics subcontractors encourages the setting up of strong inter-company links, particularly through the day to day operating processes (Action space). It brings people together and enhances the performance of the pooled systems, in particular information and communication systems.
- When sensitive logistics operations are subcontracted, shippers often want to achieve permanent audit to control on both methods and results. It encourages the development of joint methods and procedures (Know-how space).
- The desire to interface operational information and communication systems is a sign of a willingness to pool information, even knowledge. It begins to produce a joint frame of reference (moving towards the Knowledge space), a kind of common knowledge.

Despite the temptation to reintegrate logistics operations analyzed in section 2.2, all these factors indicate that shippers are not against subcontracting to logistics suppliers, on condition that information management enables them to control the logistics service produced and to maintain their ability to adapt to the environment.

For logistics suppliers, information management seems like a means of enhancing exit barriers (preventing from exclusion) by increasing shippers' substitution costs and a means to increase their taking part in value added logistics chains. To perform an informational congruence (in the mathematical sense) between the logistics supplier and the shipper is thus a strategic factor. Depending on the level of involvement desired for the co-operation, this congruence will solicit one or several of the three spaces presented in section 3.2. Logistics suppliers must then develop logistics information and communication systems (LICS) that deal with the three spaces of competence seen in section 3-2 and that are conceived enlarged to all partners in the chain, in particular the shippers.

In the Action space LICS should help logistics suppliers to decide what to do, to follow through the operation and to react against any hazards. This is the basis of service performance, quality and reliability. At this level, LICS must capture and memorize (automatically or not) all data directly produced by the logistics process (information directly issued from action). The basis of everything is to build a complete database, if possible updated in real time, of what has happened and is happening in the logistics chain. It allows logistics suppliers to inform shippers of the going on activities (to control operations and track physical flows) and to provide them with figures measuring the effectiveness and efficiency of the subcontracted activities.

This Action level is a usual operating one for LICS. As we saw in section 3-1 and 3-2, it is not sufficient. LICS must also be designed as "knowledge-based management systems" building up and enriching collective skills concerning physical flows management.

In the Know-how space, LICS could help to stabilize procedures and control systems, that is becoming a necessity in the current move towards ISO 9002[19] certification. For that, LICS can help to finalize and follow-up logistics indicators, and can keep records of service failures on the part of both the logistics supplier and the shipper. The analyze of those figures and associated data can lead to significant improvement of existing systems. It also can help logistics suppliers to develop "co-operating" know-how.
LICS should go further and help to build know-how from operation representation. This supposes that at the Action level LICS not only acquire and memorize important "rough" data bases, but are enriched with contextual information that "explain" statistical data. LICS could then help logistics suppliers to formulate their action in "behavioral rules" and build some know-how. It could help logistics suppliers to detect evolutions in the environement.
The detailed information that logistics suppliers could provide to shippers is another important Know-how issue. Subcontracted operations would be more comprehensible to shippers that could update their know-how on "the way to get things done", without being tempted to do it themselves.

[19] The principle behind this norm could be summarized by: say what you are going to do and do what you said you would.

This second level of LICS operating is actually developing. The third one is more a prospective one than an observable one.

In the Knowledge space LICS could play 3 different roles.
The first one, quite classical but insufficiently developed, is to participate in the watch process of companies and reach the teleological level of corporate management by providing managers with "strategic" and adaptative information.
The second one is to help to build adaptative knowledge (learning process). Nature of logistics is to design adaptative and transitory organizations that are in unstable equilibrium. Logistics competence probably lies in its capacity to adapt permanently plans to what is happening in the environment. LICS must support a kind of "auto-re-presentation" of activities to build a behavioral knowledge (how does organization react in front of external solicitations and internal evolution). If LICS provide a better (in the sense of adaptation, evolution) knowledge about circulation, it will also help companies to find new management responses to face the complex and changing conditions of todays environment.
The third one is to capitalize corporate collective knowledge on logistics. The aim would be to gather every piece of knowledge scattered in companies concerning physical flows, to catch it if possible where it has been created, and to imagine a permanent connection with every source of knowledge, just because a firm is a living body and people's knowledge changes with it.
Because LICS capitalizes corporate collective knowledge on all "movements" produced, it should in return help to enrich corporate knowledge, in particular with the global view of the physical activity. It can create an original process-oriented representation of the multiple operations held within and among companies that could be shared with shippers.

The building up of such LICS points out the importance of information and communication technologies that must be involved and the importance of the design of LICS. The role of exchanges between the information systems of logistics suppliers and shippers (notably interfacing the EIS and ECS[20] models) is in this case a determining factor in particular to maintain mutual trust that is a determining factor for durability of relationships. It explains trends in developing EDI communication.
This also points out that logistics suppliers absolutely need to develop specific skills about information and communication design and technologies to take full advantage of them. They must follow evolution in this domain. Each innovation can offer new opportunities but can also dramatically change the market.

[20] EIS: external information system, ECS: external communication system. Refer to N. FABBE-COSTES (1992).

5. CONCLUSION

Today, logistics supply industry appears to be maturing but relatively segmented. This competitive market is now facing a new disturbing evolution. Some important shippers that used to subcontract logistics activities are thinking about reintegrating some of them. The analyze of shippers' motivations to reintegration shows that logistics suppliers must reckon with possible reintegration, but that subcontracting is not basically brought into question. The "chances" that the move towards reintegration will happen are, in our opinion, directly linked to the attitudes that logistics suppliers will adopt. Faced with this potentially risky situation, logistics suppliers will therefore benefit from considering preventive strategic action, and many reasons justify that logistics suppliers should focus on information and skills management. Like any organization, logistics suppliers' running call upon three inter-related spaces of competence : action, know-how and knowledge. Logistics suppliers should substantially invest to develop the two upper levels that have been neglected over a considerable time. Logistics suppliers must develop logistics information and communication systems (LICS) that deal with the three spaces of competence. By doing so they could become (again) a vital "stopping-off point" for shipper logistics, as a result of their control of costs, levels of service and innovation in the logistics operations.

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